DETAILED ACTION

1. The amendment of September 30, 2009 has been received and entered. With the entry of the amendment claims 1-72 have been canceled, and claims 73-86 (including new claims 85-86) are pending for examination.

Information Disclosure Statement

2. In the IDS of April 16, 2009, Japan 10-50812 has not been considered, as no copy was provided.

Claim Rejections - 35 USC § 112

3. The rejection of claims 73-84 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement is withdrawn due to the removal of the referred to new matter in the amendment of September 30, 2009.

4. The rejection of claims 73-84 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention is withdrawn due to the clarifying amendments to claim 73 and 79 and 74 and 80 of September 30, 2009.

5. The Examiner notes that the amendments to claim 74 and 80 are supported by Figure 5 of the present application. Applicant refers to figure 1A, but the Examiner notes that Page 13 indicates that in Figure 1A, air inlet holes are provided leading to the cooling hole, providing a cooling passage extending through the wall.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 73, 74, 76-80 and 82-84 are rejected under 35 U.S.C. 103(a) as obvious over Clingman et al (US 5130163), as evidenced by "GE Silicones RTV 11" Data Sheet (hereinafter RTV 11 Sheet), and in view of Kang et al (US 5800695), and optionally, further in view of Montierth (US 4411856).

Claims 73, 78, 79, 84: Clingman teaches a method of forming a thermal barrier coating by spray coating over a surface of a component. Column 1, lines 35-60. The component has cooling holes (perforations) made in it. Figure 2 and column 2, lines 15-50 (see perforations 22, for example). A masking process where masking plugs (pins) are inserted into the cooling holes is provided. Column 2, lines 55 through column 3,

line 20. Silicone rubber, in a viscous spreadable state is applied and forced into the holes, and then dried and hardened to an elastomeric body. Column 2, line 55 through column 3, line 20. The masking plug can thus be composed of silicone rubber. Column 2, lines 60-65. The rubber would be “elastic” as it is described as “elastomeric”. Column 3, lines 10-20. The masking process includes forming the plugs so that they do not protrude above the surface of the component. Column 3, lines 1-11 and figure 4. Then blasting treatment process is provided where the surface of the component is blasted and coarsened (roughened) to prepare the surface for coating. Column 3, lines 20-30. Then a spray coating process is provided where a thermal barrier coating is formed by spray coating over the surface of the coarsened component. Column 3, lines 30-65 and column 1, lines 35-45. As to filling the holes with “liquid elastic body”, Clingman teaches that the exemplary silicone rubber that is used is RTV-11 from General Electric (column 2, lines 60-65) and that it is applied and cured (column 3, lines 10-20). RTV 11 Sheet indicates that the cured RTV 11 has a shrinkage of 0.6 %. Page 2. RTV 11 Sheet also indicates that the material is easily pourable in consistency. Page 2. Since Clingman teaches the use of a flowable, spreadable silicone rubber sealant of RTV 11; and RTV 11 is inherently understood to be easily pourable, one of ordinary skill in the art would understand that the state of the silicone rubber used in Clingman is a "liquid", or even if the flowable, spreadable silicone rubber sealant of Clingman is not understood to inherently be a liquid, the teaching of Clingman of using a flowable,

spreadable material would at least suggest that the material be in the form of a liquid, as the broad teaching of flowable, spreadable material would be inclusive of liquid.

Clingman as evidenced by RTV 11 Sheet does not specifically teach that liquid silicone rubber is injected into the cooling holes, where an injection amount of the liquid is adjusted so that the surface of the elastic body injected into each of the cooling holes protrudes above the surface when injected, and so that the masking pins after hardening do not protrude.

Kang teaches providing maskant into cooling holes in a gas turbine engine component. Column 1, lines 1-10. The maskant is provided into the holes by injecting into the cooling holes in a liquid state, and then cured to harden. Column 2, lines 15-45. The maskant is filled into the cooling holes so that the maskant is flush with the surface of the component. Column 2, lines 25-30. Kang teaches that when injecting the maskant, care should be taken that the maskant is not present on surfaces intended to be coated. Column 2, lines 39-40 and figure 4. Kang further teaches to remove any maskant that is present on the outside of the component. Column 2, lines 40-41.

Montrieth teaches that when making masking members using silicones, for example, care should be taken to account for any shrinkage which occurs in the fabrication of the mask. Column 8, lines 5-35 and 55-65.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Clingman, as evidenced by RTV 11 Sheet, to inject the maskant in a liquid state as suggested by Kang, with an expectation of providing

desirable protected surfaces because Clingman, as evidenced by RTV 11 Sheet, suggests to provide the silicone rubber maskant in a liquid state and force it into the holes followed by curing and hardening, and Kang teaches that a conventional desirable way to force maskant into cooling holes is to inject it in a liquid form and then cure to harden. Furthermore, as to the adjusting of the amount of the liquid elastic so as to protrude when injected and harden to shrink so that they do not protrude, Clingman as evidenced by RTV 11 Sheet and in view of Kang would suggest this as well, since Clingman provides adjusting the maskant to a desired position and height of the RTV 11 maskant which in use is to be even with the surface of the component and not protrude (column 3, lines 5-10 and figure 5) and Kang wants the cooling holes to be filled so that the maskant is flush with the surface of the component and maskant is not on surfaces intended to be coated, and further shows a slight protrusion on coating (column 2, lines 25-30, 35-40, figure 4) and as shown by RTV 11 sheet, the RTV 11 maskant has a known shrinkage amount, or at the least would be expected to shrink at least some degree, during curing, and one of ordinary skill in the art would clearly take this known or expected shrinkage amount into consideration when applying the material so that a desired amount of coverage occurs so that what is desired to be masked is actually masked during the coating process, so the maskant would slightly protrude on filling and shrink to not protrude, such as by being even with the surface, when the material has hardened, and coating is to be applied, since, for example, if a

material is to be even with a surface after hardening, and shrinks on hardening, it needs to be provided in an amount of more than even (protruding) before shrinking.

Optionally, as to the adjusting of the amount of the liquid elastic so as to protrude when injected and harden to shrink so that they do not protrude, it would have been obvious to modify Clingman as evidenced by RTV 11 Sheet and in view of Kang to provide this as well as suggested by Montierth, since Clingman provides adjusting the maskant to a desired position and height of the RTV 11 maskant which in use is to be even with the surface of the component and not protrude (column 3, lines 5-10 and figure 5) and Kang wants the cooling holes to be filled so that the maskant is flush with the surface of the component and maskant is not on surfaces intended to be coated, and further shows a slight protrusion on coating (column 2, lines 25-30, 35-40, figure 4) and as shown by RTV 11 sheet, the RTV 11 maskant has a known shrinkage amount, or at the least would be expected to shrink at least some degree, during curing, and Montierth provides that one of ordinary skill in the art would take this known or expected shrinkage amount into consideration when applying the material when forming a mask, so that a desired amount of coverage occurs so that what is desired to be masked is actually masked during the coating process, so the maskant would slightly protrude on filling and shrink to not protrude, such as by being even with the surface, when the material has hardened, and coating is to be applied, since, for example, if a material is to be even with a surface after hardening, and shrinks on hardening, it needs to be provided in an amount of more than even (protruding) before shrinking.

Claims 74, 80: Clingman provides that the cooling holes are not “drilled through” as the holes do not extend all the way through the component, for example. Column 2, lines 15-50 and figure 2 (shrouded side perforations 18 are offset relative to perforations 22).

Claims 76, 82: Clingman teaches that the material of the masking pin is elastic and resistant to blasting (column 3, lines 25-30), is resistant to the heat caused by the spray coating (as the plug remains after thermal spray coating and must be removed, column 4,lines 25-35), has stripping easiness as it can be entirely removed after coating (as the plug is stripped out, and as the air flow remains the same after the treatment, column 5, lines 1-10), and as to adherence and wetness to prevent thermal barrier coating material from accumulation, teaches that the bond coat and top coat do not readily adhere to the plug material and almost all particles do not adhere (column 3, lines 45-55 and column 4, lines 1-6).

Claims 77, 83: Clingman provides that the masking plug can be composed of silicone rubber. Column 2, lines 60-65. The rubber would be “elastic” as it is described as “elastomeric”. Column 3, lines 10-20.

8. Claims 75 and 81 are rejected under 35 U.S.C. 103(a) as being unpatentable over Clingman, as evidenced by RTV 11 Sheet, and in view of Kang, and optionally, further in view of Montrieth, as applied to claims 73, 74, 76-80 and 82-84 above, and further in view of the admitted state of the prior art.

Clingman, as evidenced by RTV 11 Sheet, and in view of Kang, and optionally, further in view of Montrieth, teaches all the features of these claims except that the component is specifically a combustion transition piece. Clingman does teach that the component is to be used in a gas turbine engine combustor, for example. Column 2, lines 20-25. The cooling holes and the coating can be provided in an internal periphery surface of the component. Column 1, lines 35-60 and column 2, lines 30-35 (the inside lamina 12 is the exposed surface to be treated).

The admitted state of the prior art, at pages 1-3 of the specification, teaches that combustion transition pieces (103) are well known parts of a combustor in a gas turbine with cooling holes which are to be coated with thermal barrier coatings (with masking of the holes) on an internal periphery surface of a wall.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Clingman, as evidenced by RTV 11 Sheet, and in view of Kang, and optionally, further in view of Montrieth, to use a combustion transition piece as the substrate component to be spray coated on the internal periphery as suggested by the admitted state of the prior art, with an expectation of providing desirable protected surfaces because Clingman, as evidenced by RTV 11 Sheet, and in view of Kang, and optionally, further in view of Montrieth, teaches to provide thermal barrier coatings on internal periphery of components to be used in a gas turbine engine combustor, and the admitted state of the prior art teaches that a conventional part of a combustor in a gas

turbine that contains cooling holes to be treated on an internal periphery with thermal barrier coating is a combustion transition piece.

9. Claims 85-86 are rejected under 35 U.S.C. 103(a) as being unpatentable over Clingman, as evidenced by RTV 11 Sheet, and in view of Kang, and optionally, further in view of Montrieth, as applied to claims 73, 74, 76-80 and 82-84 above, and further in view of Emer (US 6380512).

Clingman, as evidenced by RTV 11 Sheet, and in view of Kang, and optionally, further in view of Montrieth, teaches all the features of these claims except the specific chamfering of the thermal barrier coating around the cooling holes with the masking pins remaining in the holes. Clingman does teach that the top coat may accumulate as a projecting lip 48 and may sometimes completely shroud the hole, which should be mechanically pieced through the top coat over the plug of maskant. Column 4, lines 5-30.

Emer teaches that it is well known that after coating over components with cooling holes with coatings such as thermal barrier coatings, to remove coating material which may have obstructed any or all of the cooling holes to reestablish the cooling hole diameter and/or establish a proper airflow using a laser. Column 2, lines 35-60.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Clingman, as evidenced by RTV 11 Sheet, and in view of Kang, and optionally, further in view of Montrieth, to chamfer (understood, by

definition to mean cut off the edge or corner) the thermal barrier coating around the cooling holes while the masking pins remain in the cooling holes after forming the thermal barrier coating as suggested by Clingman and Emer, with an expectation of providing desirable protected surfaces because Clingman provides the suggestion of mechanically piercing holes that have been obstructed with coating while the maskant is still present, and Emer teaches that is also well known to remove coating material which may have obstructed any or all of the cooling holes to reestablish the cooling hole diameter and/or establish a proper airflow after coating, indicating that it may be desirable to open the holes after complete or partial obstruction, and this reopening after partial obstruction would by definition chamfer the thermal barrier coating around the cooling holes, since the edge of the coating would be cut off.

10. Loringer (US 6573474) teaches that it is known to provide an angled surface on a thermal barrier coating by drilling around the hole area. Figures 1-2 and column 2, lines 40-50.

Response to Arguments

11. Applicant's arguments filed September 30, 3009 have been fully considered but they are not persuasive.

Applicant has argued that Clingman and RTV 11 Sheet does not provide the injected liquid with the amount adjusted as now claimed. However, the Examiner has

cited Kang as to the suggestion to inject the liquid as discussed in the rejection above, and has further, optionally cited Montrieth as to the suggestion to adjust the amount as claimed. It remains the Examiner's position that it would be suggested to adjust the amount from the combination of references as cited above, since shrinkage would occur when hardening, which would need to be taken into account when actually supplying the material so that the correct amount for the final masking activity would be provided.

The new art to Emer has been provided as to the new features as to the chamfering.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date

of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katherine A. Bareford whose telephone number is (571) 272-1413. The examiner can normally be reached on M-F(6:00-3:30) First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy H. Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Katherine A. Bareford/
Primary Examiner, Art Unit 1792